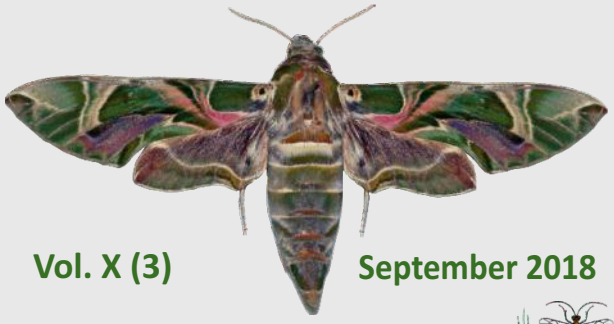
NBAIR Newsletter



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ICAR–National Bureau of Agricultural Insect Resources

Towards global outreach – a stroll through ICBC 2018

The world over it has emerged that the scientific world is becoming more interconnected, with international collaborations on the rise with a focus on hitting at the common enemy. Researchers are eager to interact with the best of their peers and gain access to complementary resources and thus enhance the efficiency, quality and visibility of their work. Recommendations of earlier international conferences state that support for international science should be maintained and strengthened through facilitation of collaborative science and that there is a need for national and international strategies for science to address global challenges and for international capacity building to ensure global sharing of impacts of scientific research. It is also realised that wide-ranging and interlinked global challenges such as climate change, food security, energy security, infectious diseases and invasive pests cannot be addressed by any one organisation or one country in isolation.

Hence, the Society for Biocontrol Advancement (SBA) and NBAIR conceived the idea of creating a platform for all stakeholders in the field of biological control to come together and exchange ideas on the opportunities available and challenges faced in adopting biocontrol strategies. SBA and NBAIR joined hands with international organisations, viz. CABI, IAPPS–*Tuta* Working Group and IOBC–Parthenium Weed Working Group to organise the First International Conference on Biological Control: Approaches and Applications (ICBC 2018), which was held at Hotel Le Meridien in Bengaluru on 27–29 September 2018.

With an increasing demand for food security and increased awareness about human and animal health and organic food, the use of biological control for pest management is expected to enhance in the coming years. The global market for macrobials was valued at USD 481.4 million in 2017, and projected to reach USD 788 million by 2022. Microbial biocontrol agents have offered some realistic alternatives to chemical pesticides when used as part of an ecologically based integrated pest management or area-wide pest management strategy. The rapid success of microbial biopesticides in several countries is due to their effectiveness and safety to non-targets in comparison to chemical pesticides. However, certain research gaps need to be addressed, which include improvement of quality, effectiveness, storage efficacy, virulence, upscaling mass production protocols and survival of biocontrol agents vis-à-vis their availability and competitiveness under stress conditions. In India, the commercial availability and utilisation of microbial biopesticides is significantly higher in comparison with that of macrobials. However, Indian experiences in the field of classical biological control of invasive pests have indicated that exchange of potential macrobials between countries through active collaboration and networking has led to spectacular successes.

(*continued on page 7*)

ICAR Director-General Dr T. Mohapatra (*centre*) and other dignitaries during inauguration

Keynote speech by Dr Quirico Migheli

Research Highlights

Report of a new invasive pest

Occurrence of the fall armyworm, *Spodoptera frugiperda* (Lepidoptera: Noctuidae) (Fig. 1), in southern India was reported, along with associated natural enemies. The incidence ranged from 9 to 62.5% at various locations, with the maximum incidence in Hassan district followed by Chikkaballapura, Davanagere, Shivamogga and Chitradurga districts during July/August 2018. Morphological and molecular taxonomic tools were used for the identification of this pest. The GenBank accession number MH704433 of Chikkaballapura population was released on 1 August 2018 and barcode was obtained from BOLD System (ID: AGIMP054-18). Surveys revealed natural parasitism by egg parasitoids, viz. *Telenomus* sp. (Platygastridae) (Fig. 2) and *Trichogramma* sp. (Trichogrammatidae) (Fig. 3), the gregarious larval parasitoid *Glyptapanteles creatonoti* (Braconidae) (Fig. 4), and a solitary larval parasitoid, *Campoletis chlorideae* (Ichneumonidae) (Fig. 5). *S. frugiperda* is the first host record for *G. creatonoti* in the world.

Fig. 1: Life stages of *Spodoptera frugiperda*

Fig. 2: *Spodoptera frugiperda* eggs parasitised by *Telenomus* sp.

Fig. 3: *Spodoptera frugiperda* eggs parasitised by *Trichogramma* sp.

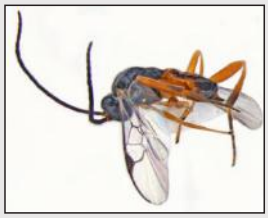


Fig. 4: *Glyptapanteles creatonoti*

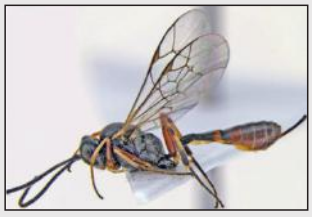


Fig. 5: *Campoletis chlorideae*

Revision of the Indian genus *Fidiobia*

The genus *Fidiobia* of the subfamily Sceliotrachelinae is represented by 26 species worldwide. Only two species, *F. nagarajae* and *F. viraktamathi*, were described from India. Surveys conducted from different parts of India resulted in 22 new species of *Fidiobia*: *F. brevinotaula* (Fig. 6), *F. carinata* (Fig. 7), *F. crocea*, *F. dantela*, *F. decora* (Fig. 8), *F. doddi*, *F. flaviabdominalis*, *F. flavifrons*, *F. fusca*, *F. galben*, *F. hima*, *F. leptidantela*, *F. longiabdominalis*, *F. multicarinata*, *F. nandi*, *F. nilgiriensis*, *F. prashanthi* (Fig. 9), *F. punyakoti*, *F. setosa* (Fig. 10), *F. striatipleura*, *F. szaboi* and *F. vandu*.

Fig. 6: *Fidiobia brevinotaula*

Fig. 7: *Fidiobia carinata*

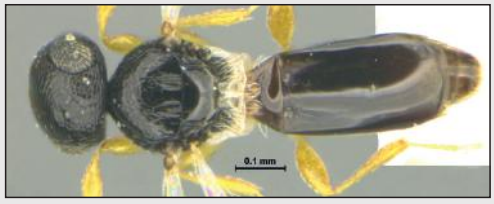


Fig. 8: *Fidiobia decora*

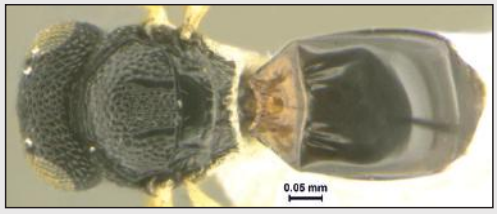


Fig. 9: *Fidiobia prashanthi*

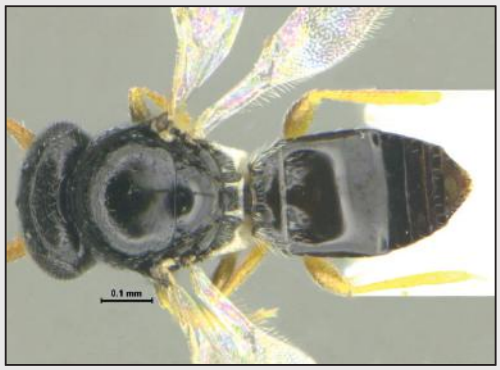


Fig. 10: *Fidiobia setosa*

New species of *Neastymachus*

A new species of the genus *Neastymachus* (Hymenoptera: Encyrtidae), *N. notialis* (Fig. 11), was described from Udupi, Karnataka. This species of wasp was reared from a container with leaves of host plant *Calophyllum inophyllum* (Calophyllaceae) with coccids, rugose spiralling whitefly, *Aleurodicus rugioperculatus* (Hemiptera: Aleyrodidae) and *Xenasteia* (Diptera: Xenasteidae). However, the exact host association could not be ascertained.

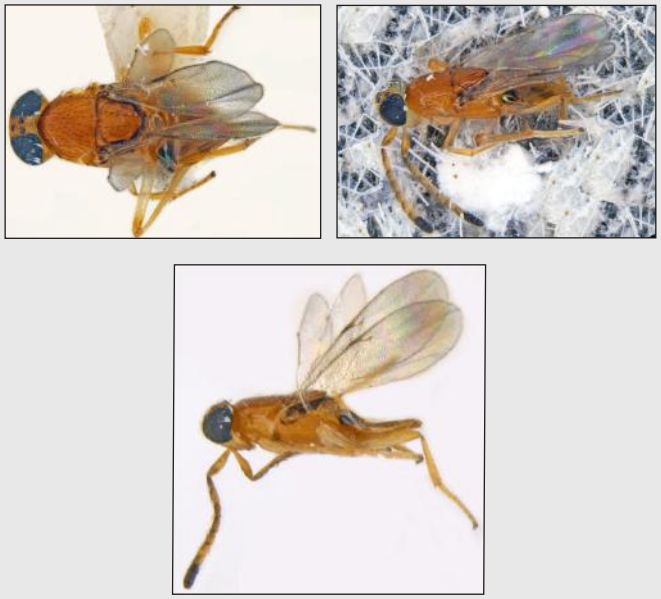


Fig. 11: *Neastymachus notialis*

New host record

Tolumnia immaculata (Fig. 12), originally described from south India, belonging to tribe Cappaeini of Pentatominae (Hemiptera: Pentatomidae), was recorded for the first time from the host plant *Buddleja asiatica*.

Fig. 12: *Tolumnia immaculata*

Pest report

Recent surveys undertaken at various locations of Sikkim revealed the infestation of *Cappaea taprobanensis* (Fig. 13), on Assam lemon and oranges.

Fig. 13: Nymphs of *Cappaea taprobanensis* aggregated on the stem of Assam lemon

Insects as decomposers

Black soldier fly (BSF) (*Hermetia illucens*) (Fig. 14) is a detritivorous insect which is neither a pest nor a vector and does not cause any nuisance or harm. The larval stage of BSF is capable of bioconversion of organic wastes in a short time. The organic waste biomass can be reduced to the tune of 50–95%. BSF rearing on organic wastes reduces odours emanating from wastes due to quicker conversion of biomass, reduces housefly and other flies breeding and also reported to reduce pathogenic microflora. A technology has been developed in NBAIR by utilising BSF to decompose farm wastes which is attracting farmers, private firms, urban residential people and poultry farmers. The BSF compost (Fig. 15) produced on kitchen waste is superior to farmyard manure, vermicompost and sheep manure, because of high amount of N, P, K along with other micronutrients and can be prepared in 60 days. BSF compost has been recorded to be very good for establishment of nursery plants like tomato, chilli, brinjal, cabbage and horticultural crops. BSF leachate is also equally nutritive which can be used for fertilizing soil through irrigation water. NBAIR has termed the BSF compost as 'Black Gold' due to its nutrient richness.

Fig. 14: Pupae of black soldier fly

Fig. 15: Compost produced by black soldier fly

Efforts as Part of Silver Jubilee Celebrations

Field survey-cum-farmers' meet on invasive rugose spiralling whitefly

As part of the silver jubilee celebrations of NBAIR, a field survey was conducted in West Godavari district of Andhra Pradesh on 4 July 2018 to determine the infestation of rugose spiralling whitefly (RSW) on coconut and oil palm. The level of pest incidence and occurrence of natural enemies were assessed by the survey team comprising Drs Chandish R. Ballal (Director, NBAIR), S.K. Jalali, K. Sreedevi, K. Selvaraj and Y. Lalitha. Natural parasitism by *Encarsia guadeloupae* to the extent of 10–15% was observed. A farmers' meet on biocontrol of insect pests with special emphasis on biological suppression of RSW was conducted on 5 July 2018 at Horticultural Research Station of Dr YSRHU, Ambajipeta, East Godavari district. Sustainable management strategies for RSW in coconut and oil palm with special emphasis on biological suppression by augmentation and conservation of the potential parasitoid, *E. guadeloupae* were discussed in the meeting.

Tribal farmers reap the benefits of ICAR's Tribal Sub-Plan Programme

Organic cultivation awareness meet in Araku valley, Andhra Pradesh

NBAIR in collaboration with Acharya N.G. Ranga Agricultural University (ANGRAU) organised a tribal farmers' meet as part of its silver jubilee celebrations on 6 July 2018 at Pedalabudu in Araku Valley mandal, which is the adopted village of the Chief Minister of Andhra Pradesh, Mr N. Chandrababu Naidu. Dr Chandish R. Ballal, (Director, NBAIR), inaugurated the event and in her talk, emphasised the importance of biological control in organic farming and encouraged the tribal farmers to use biocontrol agents in the fields extensively. *Trichogramma* and *Pseudomonas* were distributed to the tribal farmers. The programme got materialised due to the effective networking between the main centre of AICRP on Biological Control of Crop Pests, NBAIR, and the regional station of ANGRAU at Anakapalle through the ICAR's Tribal Sub-Plan Programme.

Training-cum-input supply programme in Visakhapatnam, Andhra Pradesh

A training cum input-supply programme on "Ecologically-safe management of rhizome and root rot in turmeric and ginger using biocontrol agents" was organized by NBAIR in collaboration with KVK, Bhagavathula Charitable Trust (BCT), Visakhapatnam, for the farming community in the tribal areas of Visakhapatnam under AICRP on Biological control – Tribal Sub-Plan. Two hands-on training programmes were conducted on 4 and 5 September 2018 in Thajangi and G. Madugula villages of Chintapalli in Visakhapatnam, respectively, to enlighten the farmers cultivating turmeric and ginger in these tribal areas on the use of biological means of soft rot and rhizome rot management. Biological control agents like *Trichoderma viride*, *T. harzianum* and *Pseudomonas fluorescens* were distributed to the tribal farmers. Enrichment of farmyard manure, vermicompost and oil cakes with biocontrol agents was also demonstrated to the farmers.

NBAIR joins in solving problems faced by organic farmers in Sikkim

A committee was constituted by ICAR to examine the problems encountered by farmers practising organic farming in Sikkim and to suggest suitable strategies for sustainable agriculture in the state on 23–25 July 2018. Dr A.N. Shylesha, Principal Scientist, NBAIR attended the meeting, visited the farmers' field and participated in the deliberations. During the field surveys, sporadic incidence of pests and diseases in vegetables and large cardamom was observed. The lack of organic inputs supply chain and inadequate awareness about the on-farm input generation based organic farming were identified as major constraints. It was deliberated to demonstrate the available technologies developed by ICAR–IIFSR under Network Project on Organic Farming, ICAR–RC–NEH, NBAIR, NCIPM and IISR in all the districts of Sikkim. The committee decided to replicate the successful Integrated Organic Farming System models (IOFS) demonstrated by ICAR in the Timpyem and Lower Nandok in East Sikkim at many locations. The importance of training rural youths to set up farm input generation units and the need to develop a mechanism to forecast pest and disease incidence using ICT tools for the benefit of organic growers was discussed. The importance of strengthening the quarantine mechanism especially in border areas was also deliberated.

Efforts to popularise Hindi as official language

A workshop on "Hindi as Official Language" was organised on 10 August 2018 at NBAIR in which Mr A.K. Jagadeesan, Assistant Director (Official Language) from ICAR–IIHR, Bengaluru gave a lecture on how Hindi can be put to use as an official language in the Bureau. Hindi Saptah was organised during 14–20 September 2018 in NBAIR. Ms B.K. Hema from Indian Space Research Organisation, Bengaluru who was the chief guest for the programme, emphasised the importance of Hindi as official language. Various competitions like essay writing, singing, noting and drafting were arranged as part of the programme. Mr Suraj Singh Rajput who is also an RAC member actively participated in the programme and gave his valuable inputs.

Endeavours towards empowering farmers

A farmers' training programme on "Biological control of pests and disease in grapes" was organised at NBAIR on 18 August 2018. Sixteen farmers of Karnataka Grape Export Group (KGEG), Vijayapura, were trained on various biocontrol methods for the management of grape pests. Drs M. Sampath Kumar, A. Kandan and Richa Varshney coordinated the training programme. Another farmers' training programme on "Biological control of white grub in sugarcane and cutworm management in vegetables" was organised in association with ATMA, Kolhapur at NBAIR during 5–7 September 2018. Forty-six farmers were trained on various aspects of biocontrol and EPN field application techniques for management of white grubs in sugarcane were demonstrated to them. Drs M. Sampath Kumar and Jagadeesh Patil of NBAIR, and Nikhil Prakash Kulkarni and Sundaram Bhagawan Mane of ATMA, Kolhapur, coordinated the training programme.

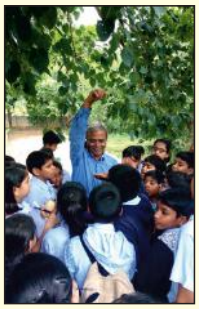
QRT review meetings at Assam Agricultural University and Central Agricultural University

The Quinquennial Review Meeting to assess the performance of AICRP centres, viz. AAU (Jorhat, Assam) and the College of Horticulture (Pasighat, Arunachal Pradesh), for the period 2012-17 was held at Assam Agricultural University, Jorhat on 21 August 2018. The need for strengthening the mass production of bioagents like *Trichogramma* was elaborately discussed during the meeting. The centres were advised to explore for local strains of microbial isolates and to disseminate the technologies by networking with state biocontrol labs and KVKs. The committee suggested that the centres should work out cost-benefit ratio not only in terms of economics but also based on environment safety because of the increased focus on organic farming in North Eastern region. The centres were also advised to include all proven technologies brought out under AICRP–BC experiments in the Package of Practices of the respective universities and to register/commercialise the proven isolates/technologies.

Outreach programmes to instill an interest in science

School students' visit to the Insectarium

Around 750 students from Presidency School, Bengaluru, visited NBAIR's Insectarium and also the farm in Yelahanka on 28 August 2018. The students were exposed to various fun facts about insects and a display of various live and preserved insect specimens were arranged to cater to the curiosity of these young ones. The students had an active interactive session with the scientists of the Bureau who answered the queries of the inquisitive minds with much enthusiasm. The kids also visited the pollinator garden on the farm and were greatly intrigued by the diversity of insects.



Utility of the Foldscope in crop protection

NBAIR conducted a programme entitled "Utility of the Foldscope in Crop Protection: Assessment-cum-Training Workshop for Farmers" at Haristhala village in Chikkaballapura district of Karnataka on 28 August 2018. The main purpose of the workshop was to introduce the Foldscope to the local farming community and to assess the utility of the gadget in crop protection. Over 35 farmers, who mainly cultivate vegetables, grapes, ragi, maize and ornamentals, were trained on assembling and using the Foldscope. An opportunity was also given to curious schoolchildren to learn about the Foldscope. The meet was organised by Dr P. Sreerama Kumar, Principal Investigator, and Ms H.N. Roja, Junior Research Fellow. Local newspapers reported about the programme.

Dr S. Pradhan Memorial Lecture by Dr Chandish R. Ballal

Dr Chandish R. Ballal, Director of NBAIR, delivered the Tenth Dr S. Pradhan Memorial Lecture on "Challenges to and opportunities for biological control practices in India" at ICAR–Indian Agricultural Research Institute, New Delhi, on 27 August 2018.

(*continued from page 1*)

The ICBC 2018 addressed issues related to various biological control approaches in the context of biodiversity, increased chemical pesticide pressure and climate change. Around 250 delegates from 20 countries across the globe participated in ICBC 2018. The deliberations were on the challenges faced by researchers, farmers and other stakeholders in implementing biological control programmes. The theme areas were: Biodiversity and Biosecurity; Conservation Strategies; Biotechnological Approaches in Biocontrol; Production and Utilisation of Macrobials and Microbials for Insect Pest and Disease Management; Biological Control Compatible Approaches; Biological Control of Invasive Pests and Weeds; Biological Control: Industrial Perspective and Policy Issues. Thus, ICBC 2018 organised by a strong team led by the organising secretary Dr S.K. Jalali (Principal Scientist and Head, Division of Genomic Resources), succeeded in creating a perfect platform for biocontrol researchers to share their experiences and foster collaborations. ICBC provided an excellent opportunity for young researchers to showcase their new ideas and research results to a global audience and for commercial entrepreneurs to pick up concepts for business proposals on production of novel and effective bioagents/biopesticides, which have great market potential.

Chandish R. Ballal
Director

Awards and Recognitions

Jawaharlal Nehru Award

Dr K.J. David received the prestigious *Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2017* in 'Crop Protection' category on 16 July 2018 in New Delhi.

International Travel Support

Dr P. Sreerama Kumar chaired a session on biological control and presented a talk at the "XV International Congress of Acarology" in Antalya, Turkey, 2–8 September 2018. He received International Travel Support from the Science and Engineering Research Board of the Department of Science and Technology, Government of India.

Awards bagged by NBAIR scientists at ICBC 2018, Bengaluru (27–29 September 2018)

Best oral presentations

Dr T. Venkatesan
Dr K. Subaharan
Dr G. Sivakumar
Dr K.J. David
Dr Ankita Gupta
Dr K. Selvaraj
Dr Jagadeesh Patil
Dr Richa Varshney

Best poster presentations

Dr P. Sreerama Kumar
Dr A. Kandan
Dr R.S. Ramya
Dr Omprakash Navik

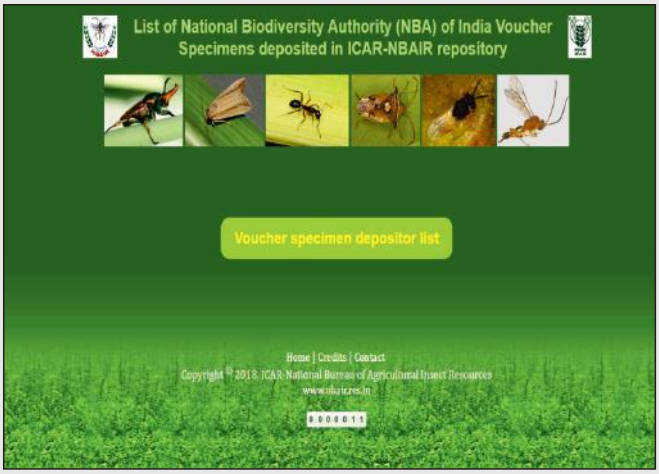
Welcome!

Mr R. Maruthi Mehanth, Technical Assistant (T3), joined NBAIR on 19 September 2018 in the Division of Germplasm Conservation and Utilisation.

Mr K.M. Venugopala, Technical Assistant (T3), joined NBAIR on 28 September 2018 in the Division of Genomic Resources.

New Online Database

A new online database on 'National Biodiversity Authority Voucher Specimens Deposited in NBAIR Repository' has been hosted on NBAIR website for public access.



Selected Publications

Amala, U. & Shivalingaswamy, T. M. 2018. Nesting biology, seasonality and host range of sweat bee, *Hoplonomia westwoodi* (Gribodo) (Hymenoptera: Halictidae: Nomiinae). *Sociobiology*, 65(3): 491–496.

Hayat, M., Gupta, A. & Selvaraj, K. 2017. A new species of *Neastymachus* Girault (Hymenoptera: Encyrtidae) from Karnataka state of India. *Journal of Insect Systematics*, 4(2): 113–116.

Shylesha, A.N., Jalali, S.K., Gupta, A., Varshney, R., Venkatesan, T., Shetty, P., Ojha, R., Ganiger, P.C., Navik, O., Subaharan, K., Bakthavatsalam, N., Ballal, C.R. 2018. Studies on new invasive pest *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae) and its natural enemies. *Journal of Biological Control*, 32(3): 1–7.

Compiled and edited by: **P. Sreerama Kumar, R.S. Ramya, U. Amala & Chandish R. Ballal**
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